# PROPOSED ACTION MEMORANDUM FOR THE SOURCE REMOVAL AT TRENCH 1 IHSS 108

DRAFT

**March 25, 1997**

**Draft 0**
**Document Control Number RF/RMRS-97-????**

**FOR THE SOURCE REMOVAL AT THE TRENCH 1**
**IHSS 108**

## TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

## ACRONYMS

| | |
|---|---|
| AHAs | Activity Hazard Analysis |
| ALF | Action Levels & Standards Framework |
| AOC | Area of Contamination |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| CAMU | Corrective Action Management Unit |
| CCR | Colorado Code of Regulations |
| CERCLA | Comprehensive Environmental Response Compensation and Liability Act |
| CFR | Code of Federal Regulations |
| COC(s) | Contaminant(s) of Concern |
| CSS | Contaminated Soil Stockpile |
| CWTF | Consolidated Water Treatment Facility |
| DOE | Department of Energy |
| EPA | Environmental Protection Agency |
| HEPA | High Efficiency Particulate Air |
| HASP | Site-Specific Health and Safety Plan |
| IHSS | Individual Hazardous Substance Site |
| LDRs | Land Disposal Restrictions |
| LLRW | Low Level Radioactive Waste |
| mg/L | Milligrams Per Liter |
| mg/Kg | Milligrams Per Kilogram |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NEPA | National Environmental Policy Act |
| OSHA | Occupational Safety and Health Administration |
| PA | Protected Area |
| PAM | Proposed Action Memorandum |
| PCE | Tetrachloroethylene or Perchloroethylene |
| pCi/g | Pico Curies Per Gram |
| PPE | Personal Protective Equipment |
| RACT | Reasonable Available Control Technologies |
| RCRA | Resource Conservation and Recovery Act |
| RFCA | Rocky Flats Cleanup Agreement |
| RFETS | Rocky Flats Environmental Technology Site |
| RMRS | Rocky Mountain Remediation Services |
| RFI/RI | RCRA Facility Investigation/Remedial Investigation |
| SAP | Sampling and Analysis Plan |
| TCE | Trichloroethene |
| TDU | Thermal Desorption Unit |
| TUs | Temporary Units |
| UCL | Upper Confidence Limit |
| VOC(s) | Volatile Organic Compound(s) |

# 1 0 PURPOSE

This Proposed Action Memorandum (PAM) outlines the project approach and applicable requirements for the excavation and subsequent segregation and treatment of depleted uranium chips and associated soils and wastes at Trench 1 (T-1), Individual Hazardous Substance Site (IHSS) 108 T-1 is ranked number five (of over 200 sites) in the Environmental Ranking [Attachment 4 to the Rocky Flats Cleanup Agreement (RFCA), DOE, 1996] T-1 received a high ranking because it is the single largest known source of radioactive contaminants buried at the Rocky Flats Environmental Technology Site (RFETS) The location of T-1 is shown on Figure 1-1

Objectives of the proposed accelerated action are to remediate the risk posed to future users of the site by removing and stabilizing the potentially pyrophoric uranium from the trench and removing and treating (if necessary) debris contaminated soils, and other materials that may be contained in the trench Upon completion of the accelerated action the trench will not contain depleted uranium or soils contaminated above RFCA Tier I action levels for radionuclides or volatile organic compounds (VOCs), and the T-1 area will have been reclaimed This source removal will remediate one of the top five IHSS sites at RFETS

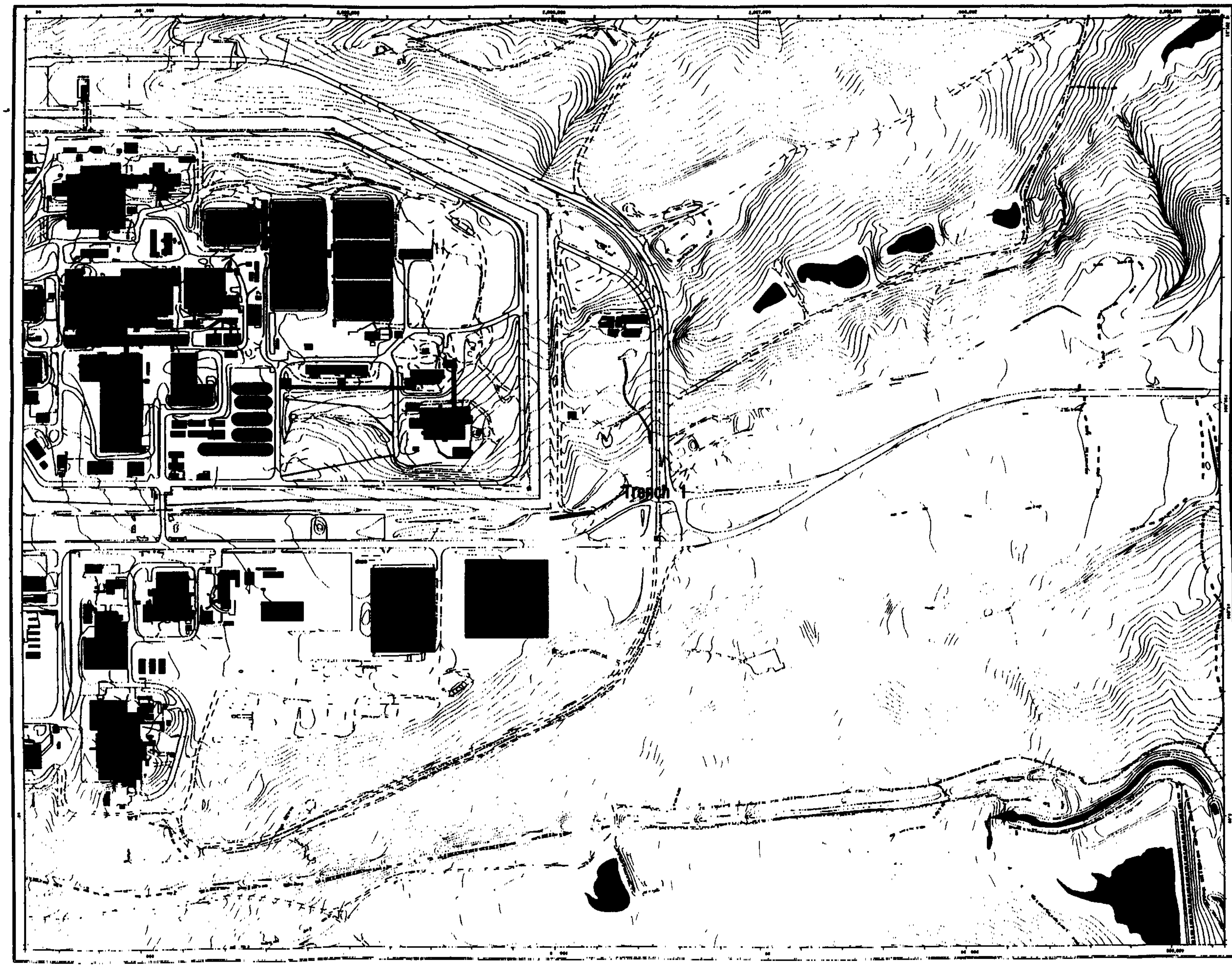
DRAFT

Environmental remediation of T-1 will consist of excavation of the materials in the trench, segregation of contaminated and uncontaminated soils and materials, treatment of depleted uranium to a stabilized form, and off-site disposal of the stabilized waste and other contaminated materials (estimated 300-600 cubic yards)

This source removal is being conducted in accordance with the RFCA, and Federal, State, and local laws as well as U S Department of Energy (DOE) Orders and RFETS policies and procedures Following stabilization by encapsulation the depleted uranium and associated materials addressed by this action are expected to be Low Level Radioactive Waste (LLRW) At the conclusion of the project clean backfill and thermally treated soils (if any) below RFCA Tier II action levels will be returned to the T-1 excavation and the area reclaimed Remedial activities performed under this PAM will be consistent with and contribute to the efficient performance of anticipated long-term remedial action for the buffer zone and will be conducted in a manner which is protective of site workers the public and the environment

# Figure 11

## Trench 1
## Site Location Map




EXPLANATION

Contours (5 intervals)

Trench 1

Standard Map Features

Buildings or other structures

Lakes and ponds

Streams, ditches, or other drainage features

Fences

Paved roads

Dirt roads

DRAFT

Scale 5430
Inch represents approximately 453 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Sit

Prepared by
RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 97-0000

March 19, 1997

# 2 0 PROJECT DESCRIPTION

T-1 is located just northwest of the inner east gate and about 40 feet south of the southeast corner of the Protected Area (PA) fence (Figure 1-1) The trench is approximately 250 feet long, 16 to 22 feet wide and 10 feet deep Historical documentation indicates depleted uranium metal chips (lathe and machine turnings) packed in lathe coolant were buried in the west end of T-1 in approximately 125 drums The drums were reportedly double stacked end-on-end in the trench and covered with one to two feet of soil No written documentation exists for the contents of the center and east end of the trench Interviews with former site workers indicate that the eastern two-thirds of the trench is likely to contain trash (pallets paper) and debris such as empty or crushed drums

Under this proposed action, the drums of depleted uranium chips and incidental contaminated soils will be excavated and treated to stabilize the potentially pyrophoric nature of the uranium chips Soils contaminated with high levels of depleted uranium above RFCA Tier I action levels will also be excavated and stabilized, as required The stabilized wastes and contaminated soils will be shipped off-site for disposal

DRAFT

The available historic information and recent characterization data do not indicate that T-1 is a source of VOC contamination to subsurface soil or groundwater If extensive VOC contamination above Tier I action levels is encountered in the trench these materials would be temporarily stored pending treatment by low temperature thermal desorption The thermal desorption process has been used successfully at similar sites at RFETS

## 2 1 Background

Drums of waste from Building 444 were first placed in T-1 in November 1954 and burial operations continued intermittently until December 1962 Wastes were initially buried in T-1 when Building 444 could not safely process drums of depleted uranium turnings that were combustible and presented a pyrophoric hazard The pyrophoric nature of this waste made transporting the depleted uranium (often called tuballoy or D-38) a safety hazard The depleted uranium chips were in drums which also contained oil coolant (primarily a mixture of water mineral oil fatty amides) dirt and other foreign material Historical information indicates other wastes are buried in T-1 from Building 444 including ten drums of cemented cyanide one drum of still bottoms and ' copper alloy The east end of the trench is expected to contain crushed drums broken pallets debris and trash

The depleted uranium casting and machining began in Building 444 in 1953 (Chem Risk 1992) The production operations in Building 444 were conducted to support war reserve special order and manufacturing development work Weapons components were fabricated from various materials such as depleted uranium, beryllium, stainless steel, and aluminum (EG&G,1993) Operations in Building 444 included casting, fabrication, assembly, inspection and testing, coating and heat treating, plating, special projects and support operations Machining operations included turning, facing, boring, milling, and sawing of the above materials using lathes, saws, milling equipment and other conventional machine tools (EG&G, 1994, EG&G,1991) In 1956 the chip roaster began operation in Building 447 to roast depleted uranium chips from the machining processes conducted in Building 444 The roaster was out of service from 1959 to 1961 (EG&G, 1991) The waste depleted uranium chips in lathe coolant, dirt, and floor sweepings were stored on the Building 444 dock before the roaster became operational and during the roaster shutdown period It was during these periods that wastes from Building 444 went to T-1 and also to the Mound Site for burial

## 2 2 Existing Conditions

The T-1 area was investigated during the Operable Unit 2 (OU 2) Phase II Resource Conservation and Recovery Act (RCRA) Field Investigation/Remedial Investigation (RFI/RI) Program (DOE 1995) Additional characterization was conducted as part of the 1995 Trenches and Mound Site investigation (Rocky Mountain Remediation Services 1996) Due to the suspected presence of pyrophoric uranium and its associated hazards, no drilling or subsurface sampling was performed inside of the Trench T-1 boundaries

The Trench T-1 area was investigated in 1995 using the following methodologies

- Historical data were compiled using the Historical Release Report and supplemented with employee interviews to identify buried materials potential contaminants, trench location, and trench size

- Aerial photographs were examined to identify disturbed areas, verify trench dimensions and location, and determine time of operation

- A site visual survey was performed to identify physical features and establish a geophysical sampling grid

- Electromagnetic and Ground Penetrating Radar surveys were conducted to locate buried conductive and/or metallic objects and define trench boundaries

- Soil gas surveys were conducted to identify and delineate potential contaminant plumes

Historical records and information obtained through employee interviews indicate that as many as 125 30-gallon and 55-gallon steel drums containing depleted uranium chips and turnings and miscellaneous debris are disposed in T-1 Drum inventory lists, memoranda, and drum shipping logs documenting the placement of 85 drums in T-1 have been located The Inventory lists and former employee interviews indicate that the depleted uranium waste disposed in T-1 originated from Building 444 The uranium chips and turnings were coated with a water-soluble lathe coolant (trade name CimCool) during machining of parts The inventory records also include ten drums of cemented cyanide waste from Building 444 Cyanide and cadmium wastes are known to have been generated during metallurgical operations in Building 444

A pilot-scale 55-gallon drum evaporator was reportedly used in Building 444 for reducing machine coolant oil waste volume (DOE 1992) The resulting condensate was transferred to the process waste treatment system in Building 774 (Hornbacher 1994) and the "still bottoms" were 'drummed and buried through normal disposal channels (Rains and Hawley, 1955, Cichorz, 1970) 'Still bottoms" from Building 444 could potentially consist of either the lathe coolant sludge discussed above or still bottoms from the recovery of residual trichloroethene and perchlorethene waste solvents and sludge generated from machined parts cleaning

Several of the drums containing depleted uranium and lathe coolant oil are described in historical documents as 30-gallon drums placed inside 55-gallon drums and then over packed with graphite The graphite is believed to have been excess material derived from waste graphite molds utilized during production operations in Building 444

Personnel directly involved in the trench disposal activities stated that the buried 30- and 55-gallon drums were generally double-stacked in the trench on-end (vertically) in rows of 4 to 5 drums across The trench is estimated to be approximately 10 feet deep 16 feet wide and 200 to 250 feet long This correlates well with investigation results The bulk of the drums containing depleted uranium were reportedly disposed in the west portion of the trench from 1954 to 1962 Individual groups of drums were reportedly completely covered with one to two feet of soil immediately after placement in the west end of T-1 Miscellaneous debris was placed mostly in the central and eastern portions of the trench until the trench was closed in 1962 The drums and debris were covered with one to two feet of soil

Weed cutting activities in October and November 1982 unearthed two drums not adequately covered with fill material Both drums were sampled and successfully removed for offsite disposal One drum contained an oil/water mixture which yielded plutonium analyses of 55 pico-curies per liter (pCi/l) and uranium analyses of 2 3 X $10^5$ pCi/l The other drum was found to contain an oily sludge which yielded results of 4 3 picocuries per gram (pCi/g) plutonium and 1 2 x $10^6$ pCi/g uranium (Illsley 1983)

Conflicting information was found during this historical review regarding the potential contaminants in the trench All references that mention the origin of the waste confirm that it was from Building 444 exclusively It is believed from interviews with retired Rocky Flats employees and the HRR that Building 444 processed uranium and not plutonium, yet, several references state that analytical results from the drum uncovered in 1982 indicated the presence of plutonium (DOE, 1992) The presence of low levels of plutonium (if confirmed) will not affect the project approach

## 2 3 Hydrogeologic Setting

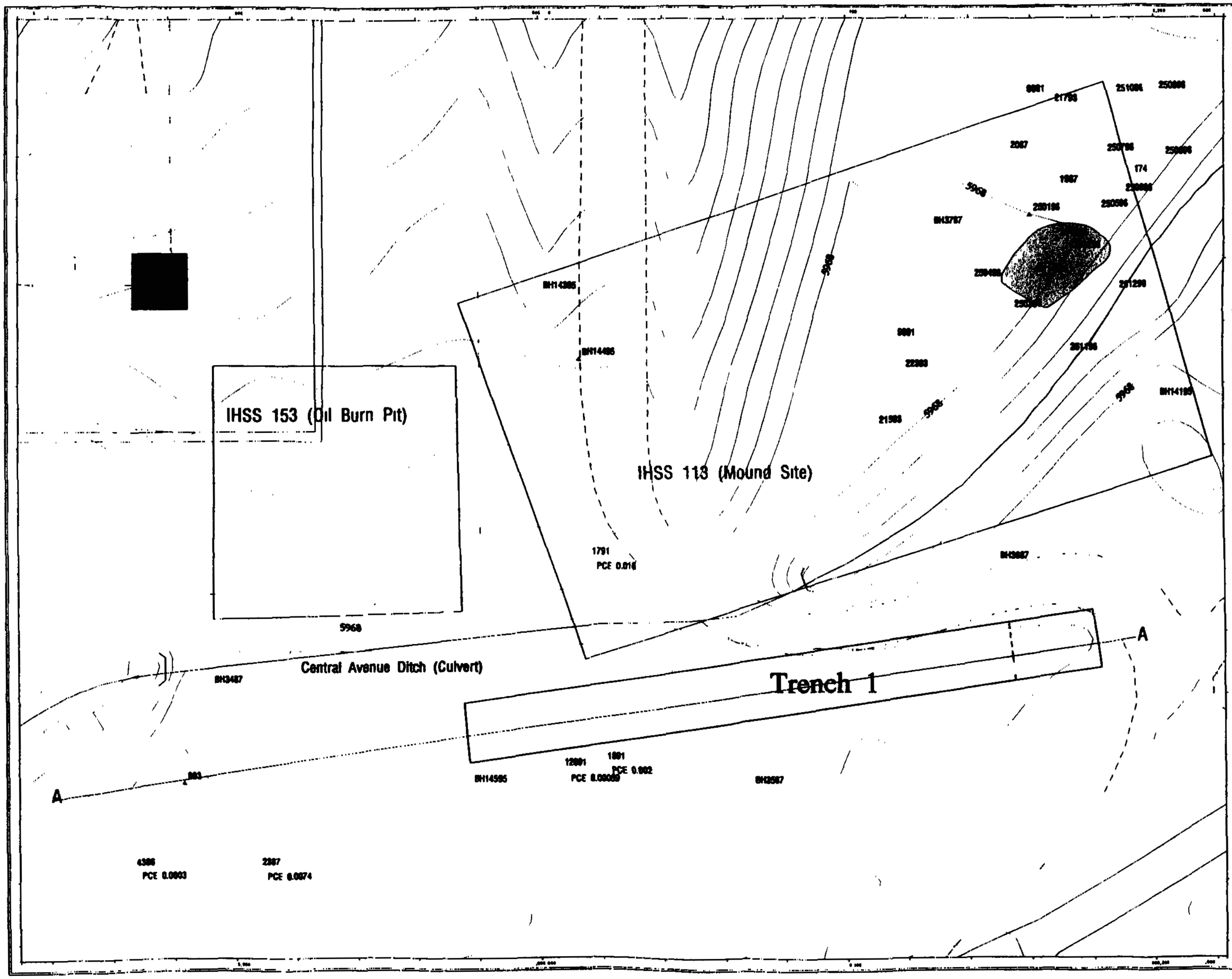
The hydrogeologic setting consists of 12 to 25 feet of poorly consolidated Rocky Flats Alluvium and disturbed soil unconformably underlain by bedrock consisting of weathered claystone and minor sandstones of the Cretaceous Arapahoe and Laramie Formations (DOE, 1995) The Rocky Flats Alluvium consists of lenses of poorly to moderately sorted clayey and silty gravels and sands interbedded with clay and silty lenses Mean hydraulic conductivities are $2 \times 10^{-4}$ centimeters per second (cm/s) for the Rocky Flats Alluvium and $8\ 8 \times 10^{-7}$ cm/s for the weathered claystone of the Arapahoe Formation (EG&G 1995) The T-1 area consists of one to two feet of artificial fill deposits over the Rocky Flats Alluvium The surface soils in the vicinity of T-1 were extensively disturbed during the creation and removal of the Mound Site construction of the Protected Area fence, excavation of the Central Avenue ditch, and other construction activities in the area (DOE 1995)

The locations of boreholes and wells used to characterize the T-1 area are presented in Figure 2-1 Groundwater seasonally ranges in depth from approximately 10 feet below ground surface to below the contact between the underlying Arapahoe Formation and the Rocky Flats Alluvium The depth to groundwater can fluctuate up to approximately 6 feet below ground surface The water table occasionally reaches the level of the drums in the trench

Seasonal recharge from the ground surface and the unlined Central Avenue ditch causes shallow groundwater to flow towards the north Figure 2-2 depicts the generalized hydrogeologic cross section at the T-1 site An east-west trending bedrock high is located between the 903 Pad and the T-1 area, just south of the trench (DOE, 1995) Groundwater within the saturated alluvium south of the trench has been interpreted to flow eastward along the south side of the bedrock high

## 2 4 Trench 1 Characterization Data Summary

Evaluation and characterization of the environmental conditions in the vicinity of T-1 was conducted using available data compiled from the OU 2 Phase II RFI/RI report (DOE 1995) and the Draft Trenches and Mound Site Characterization Report (RMRS 1996) Subsurface soil and groundwater data evaluated include analytical results from three boreholes and five groundwater monitoring wells installed near the west portion of T-1 in 1986 1987 and 1991 In addition a limited soil gas survey was performed at the trench site to screen for VOCs Electromagnetic and




# Figure 2-1
# Mound and Trench T-1 Borehole and Groundwater Well Location Map

EXPLANATION

- Line of Hydrogeologic Cross Section
- Contours (2 intervals)
- IHSS Boundary
- Central Avenue Ditch
- Trench Boundary
- Historical Trench T-1 East Boundary
- Groundwater Well Locations (Note: PCE 0.016 Tetrachloroethene at 0.016 mg/L)
- Borehole Locations
- Area to be excavated

Standard Map Features

- Buildings or other structures
- Fences
- Paved roads
- Dirt roads

NOTE: SS Boundaries are very general

DRAFT

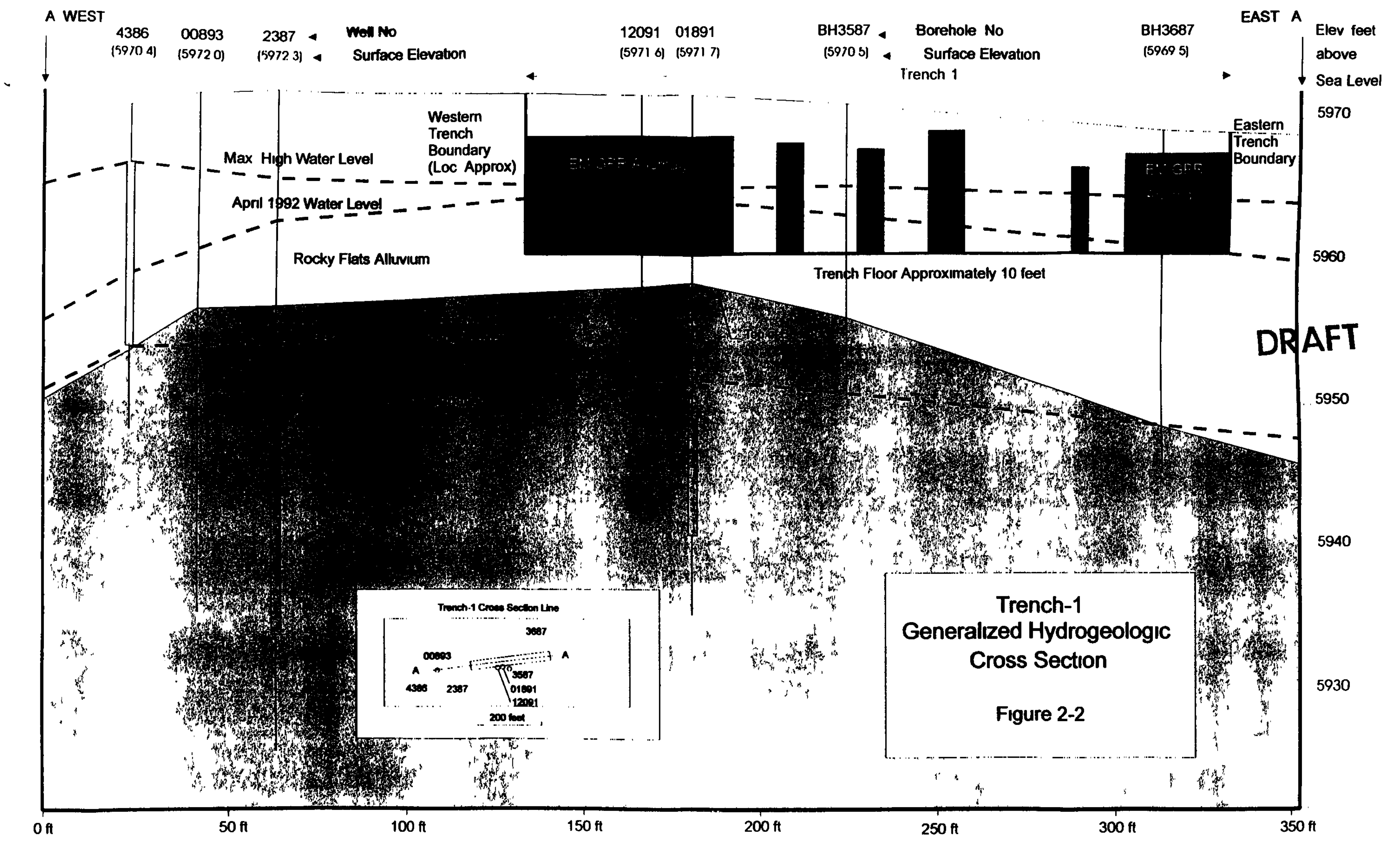
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 7-0000

March 18, 1997



Trench-1
Generalized Hydrogeologic
Cross Section

Figure 2-2

ground penetrating radar surveys were conducted at the site in 1995 to locate buried conductive objects and define the trench boundaries

The available subsurface soil and groundwater data does not provide conclusive information to characterize the entire trench site (i e , the central and east portions of the trench area), or determine if the site is contributing to subsurface contamination in the area However, because this source removal action is focused on removing and stabilizing the drums of depleted uranium known to be in the trench complete environmental characterization of the trench area is not required to perform the T-1 accelerated action Based on review of the available data for T-1, there does not appear to be significant subsurface soil or groundwater contamination in the area surrounding T-1 A summary of the T-1 characterization data is presented below

2 4 1 Groundwater

Groundwater data was obtained for five monitoring wells (4386, 2387 12091, 1891, and 1791) near the west portion of T-1 (see Figure 2-2) Well 4386 is screened in the Rocky Flats alluvium The remaining wells are screened in weathered claystone of the Arapahoe Formation (DOE 1995) Because of the limited well placement, no data is available for groundwater flowing beneath the central and eastern portions of the trench

Wells 12091 and 1891 are located approximately 10 feet south of the southern boundary of the trench approximately 40 feet east of the southwest corner of the trench boundary These two wells are likely hydraulically upgradient or cross-gradient to the trench (see Figure 2-1) Monitoring wells 4386 and 2387 are located about 130 feet and 75 feet west of the west trench boundary and are located cross-gradient and/or upgradient to the trench The remaining well 1791 is approximately 45 feet hydraulically downgradient (north) of the western portion of the trench Groundwater sample results for the upgradient wells (12091 1891 4386 and 2387) and the downgradient well (1791) are summarized in Table 2-1

Low concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) were detected in all five monitoring wells The PCE measured in the downgradient well 1791 exceeded the RFCA Tier II groundwater action levels However PCE also exceeds this action level in upgradient well 2387 There are not enough data available to determine whether PCE in groundwater at well 1791 is from either the same sources as well 2387 or from a source in T-1 The presence of contamination in wells upgradient and/or cross-gradient to T 1 has been linked to the 903 Pad and other potential sources

Methylene chloride was detected in wells 2387 12091 1891 and 1791 Methylene chloride is a common laboratory and sampling analytical contaminant It is not known to have been used extensively as a solvent at RFETS Therefore, PCE and TCE are used as indicators of groundwater contamination in relation to T-1

Dissolved uranium-233/234, and uranium-238 activities observed in all five wells exceed Tier II groundwater action levels However, all of these activities are within the background uranium ranges of the respective isotopes as defined by the mean plus two standard deviations

**TABLE 2-1**
**SUMMARY OF GROUNDWATER SAMPLE RESULTS**

| ANALYTE | WELL 4386 | WELL 2387 | WELL 12091 | WELL 1891 | WELL 1791 | TIER II ACTION LEVELS | BACKGROUND (M2D) | UNITS |
|---|---|---|---|---|---|---|---|---|
| Methylene Chloride | ND | 0 008 | 0 016 | 0 007 | 0.022 | 0 005 | NA | mg/l |
| Tetrachloroethene | 0 0003 | 0 074 | 0 00059 | 0 002 | 0 016 | 0 005 | NA | mg/l |
| Trichloroethene | <0 005 | <0 005 | 0 0003 | <0 0002 | 0 001 | 0 005 | NA | mg/l |
| Plutonium-239/240 | -0 20 | 0 0250 | ND | ND | ND | 0 151 | 0 01 | pCi/l |
| Americium-241 | 0 11 | 0 10 | ND | ND | ND | 0 151 | 0 013 | pCi/l |
| Uranium-233/234 | 9 858 | 3 60 | 5 643 | 5 0 | 4 0 | 2 98 | 60 7 | pCi/l |
| Uranium-235 | 0 301 | 0 30 | 0 279 | 1 0 | 1 0 | 1 01 | 1 79 | pCi/l |
| Uranium 238 | 7 629 | 2 20 | 4 337 | 3 0 | 4 0 | 0 768 | 49 | pCi/l |

Notes
All concentrations reported are maximum observed
All concentrations reported for metals and radionuclides are for dissolved analyses
ND = Not Detected
NA = Not Applicable
mg/l = milligram per liter
pCi/l = picocuries per liter
Values used for the radionuclide background comparisons are the background mean plus two standard deviations (M2D) These values were obtained from the draft Background Comparison for Radionuclides in Groundwater report (DOE 1997)

2 4 2 Soil

Subsurface soil samples were collected from three boreholes (BH3487 BH3587 and BH3687) in the vicinity of T-1 (see Figure 2-1) Subsurface soil sampling from beneath the bottom of the trench was attempted by using angle drilling methods but was unsuccessful due to the amount and size of cobble material encountered

Organic Compounds in Soil

Results from the Phase II RFI/RI investigations and the Trenches and Mound Site Characterization indicate that no VOC semivolatile organic compound (SVOC) or polychlorinated biphenyls (PCB) concentrations detected in the vicinity of T-1 exceed the RFCA Tier II subsurface soil action levels

Metals in Soil

Cadmium was detected in subsurface soil samples collected from borehole BH3487 [2 0 to 3 1 milligrams per kilogram (mg/kg)] BH3587 (2 2 to 3 3 mg/kg) and BH3687 (2 0 to 2 4 mg/kg) Arsenic was detected at 14 mg/kg in borehole BH3587 at a depth of 18 to 19 feet At this writing the RFCA subsurface soil action levels for cadmium and arsenic have not been determined

Radionuclides in Soil

Available analytical results for radionuclides in soil are summarized in Table 2-2 for comparison to RFCA Tier II subsurface soil action levels None of the radionuclide activities exceeded the RFCA Tier II action levels Plutonium-239/240 and americium-241 activities detected in each of the three boreholes generally decreased with depth, indicating the sources of these radionuclides are likely present in or near the surface The maximum plutonium-239/240 activity (1 5 pCi/g) was observed from the 0 to 12 foot sample interval in borehole BH3587 Borehole BH3687 was observed with 1 7 pCi/g uranium-238 from the surface to 5 feet and 2 2 pCi/g uranium-238 at a depth of 18 to 20 feet (see Figure 2-1)

It is anticipated that uranium activities in subsurface soil immediately beneath T-1 will exceed the RFCA Tier I subsurface soil action levels Soil samples will be collected during excavation of the trench for evaluation of radionuclides

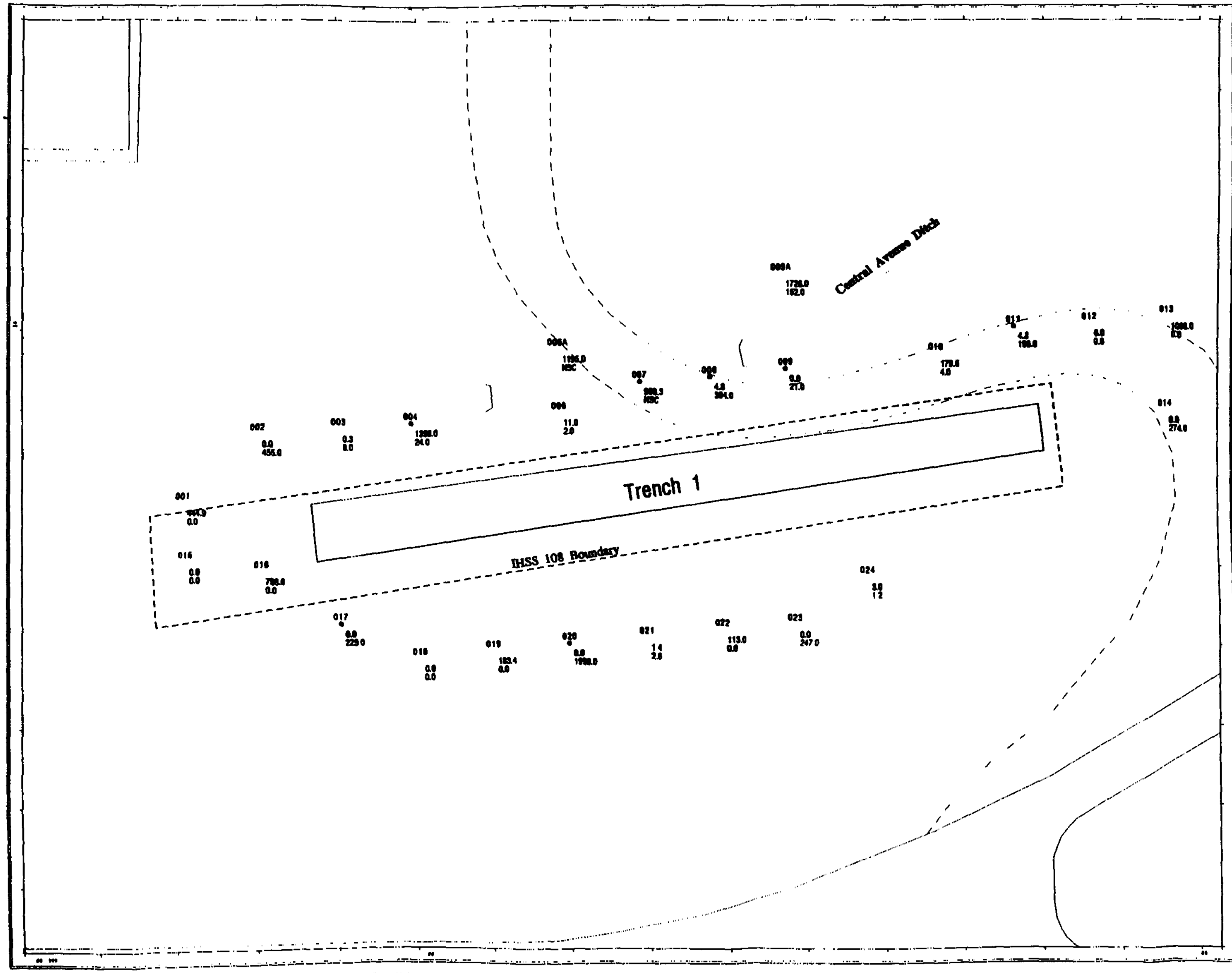
# TABLE 2-2
# SUMMARY OF RADIONUCLIDE RESULTS FOR SUBSURFACE SOIL

| BOREHOLE | SAMPLE DEPTH (ft) | ANALYTE | CONCENTRATION (pCi/g) | TIER II(*) SUBSURFACE SOIL ACTION LEVELS (pCi/g) |
|---|---|---|---|---|
| BH3487 | 8 to 14 7 | Plutonium-239/240 | 0 09 | 252 |
| | 17 to 18 | Plutonium-239/240 | 0 06 | 252 |
| BH3587 | 0 to 12 | Americium-241 | 0 40 | 38 |
| | 0 to 12 | Plutonium-239/240 | 1 5 | 252 |
| | 12 to 15 | Americium-241 | 0 02 | 38 |
| | 12 to 15 | Plutonium-239/240 | 0 06 | 252 |
| | 14 to 15 | Americium-241 | 0 06 | 38 |
| | 18 to 19 | Americium-241 | 0 03 | 38 |
| BH3687 | 0 to 5 | Americium-241 | 0 12 | 38 |
| | 0 to 5 | Plutonium-239/240 | 0 53 | 252 |
| | 0 to 5 | Uranium-238 | 1 7 | 103 |
| | 5 to 15 | Americium-241 | 0 03 | 38 |
| | 18 to 20 | Americium-241 | 0 04 | 38 |
| | 18 to 20 | Plutonium-239/240 | 0 03 | 252 |
| | 18 to 20 | Uranium-238 | 2 2 | 103 |
| | 23 to 25 | Americium-241 | 0 08 | 38 |

* Based on an annual dose limit of 15 millirem to a hypothetical future resident

Soil Gas Survey

Soil gas samples were collected at depths of five and ten feet below ground surface at 25 sample locations around the perimeter of the trench to screen for total volatile organic compounds (TVOCs) using an organic vapor analyzer No samples were collected within the trench




# Figure 2-3

## Trench 1
## Soil Gas Survey Results

**EXPLANATION**

IHSS Boundary

Trench Boundary

Soil Gas Locations

**NOTE**

Example Soil Gas Results for Total Volatile Organic Compounds (TOVC) Detected in (ppm) sing Photoio i ation D tector

010

179.5 Depth 5 Feet
4.0 Depth 10 Feet
NSC No Sample Collected

**Standard Map Features**

Lakes and ponds

Streams, ditches, or other drainage features

Fences

Paved roads

Dirt roads

DRAFT

N

Scale 1 280
1 inch represents approximately 23 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by

RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 97-0078

March 24, 1997

boundaries because of the suspected presence and potential hazards associated with pyrophoric uranium The soil gas survey results are presented in Figure 2-3

Elevated levels of TVOCs were detected in 19 of 24 sample locations ranging from 11 parts per million (ppm) to 1,999 ppm at site 020 The TVOC levels detected north of the trench boundary were generally higher than those observed to the south The highest TVOC result was measured at sample location 020 approximately 25 feet south of the northern trench boundary To the north of the trench higher TVOC readings were encountered in boreholes further from the trench (006A and 009A) The survey results do not show a definite trend in TVOC concentrations with depth or location in the vicinity of the trench Based on the limited data obtained no source from within the trench area was identified This conclusion was based on comparison of the soil gas survey data with that from other areas with known VOC sources The soil gas survey was performed in the Spring of 1995 the wettest spring in 25 years Although soil gas surveys are unreliable if conducted when the vadose zone contains high water content and the water table is high it is reasonable to conclude that T-1 is not a major source of TVOCs

<u>Electromagnetic and Ground Penetrating Radar Surveys</u>

Two electromagnetic surveys were performed to locate buried conductive objects and define the trench boundaries Both surveys identified anomalies representing areas within the trench most likely to contain buried metallic objects The anomalies were identified in the west end and to a lesser extent in the east end of the trench The anomalies vary in size from 10 to 24 feet wide and indicate that the trench is approximately 200 feet in length

Ground penetrating radar surveys were performed to determine the extent of T-1 The surveys indicated that the trench width varies from 10 to greater than 20 feet The GPR survey results show that the trench is approximately 6 to 10 feet deep The geophysical survey results are consistent with information obtained from the interviewed employees formerly associated with T-1 activities

## 3 0 PROJECT APPROACH

The proposed accelerated action will entail excavating drums containing depleted uranium chips in lathe coolant associated radiologically contaminated soils and other wastes and debris from T-1 Materials will be segregated as they are removed from the trench and further segregated in a staging area Depleted uranium chips will be stabilized by encapsulation to address their potential pyrophoricity Associated radiologically contaminated soils will be excavated treated if necessary, and staged for off-site disposal The project will be conducted in accordance with the RFCA guidelines DOE Orders and RFETS policies and procedures The project will also utilize lessons learned from previous accelerated actions conducted at RFETS and other DOE - complex sites

**Process selection** - Several alternative processes for the stabilization of the potentially pyrophoric depleted uranium wastes were evaluated for this project The processes evaluated were thermal oxidation, chemical oxidation, and stabilization by encapsulation All three processes have been successful in converting pyrophoric uranium to a stable, non-reactive form. Thermal oxidation requires extensive off-gas treatment to control emissions Chemical oxidation can produce both chlorine and hydrogen gas during the process and may not be appropriate for the anticipated mixture of soils, lathe coolant and other impurities Both thermal and chemical oxidation would produce waste streams in addition to stabilized uranium oxide These waste streams would require further stabilization or treatment prior to disposal Thermal and chemical oxidation would both require pre-treatment of the waste, and separation of coolant, soils, and other material from the depleted uranium. Stabilization of the uranium chips by cementation type processes was selected based on the simplicity of the process, its ability to handle uranium chips coated with lathe coolant and mixed with soil and debris, and its history as a safe, proven technique for converting the depleted uranium to a non-reactive form.

## 3 1 Proposed Action Objectives

Objectives of the proposed accelerated action are to remediate the risk posed to future users of the site by removing and stabilizing the potentially pyrophoric uranium from the trench and removing and treating (if necessary) contaminated debris, soils, and other material that may be contained in the trench All materials above RFCA Tier I action levels (except if the limiting conditions described in section 3 2 1 are met) will be removed from the trench, treated as necessary, and staged for disposal Upon completion of the accelerated action, the trench will not contain depleted uranium or soils contaminated above RFCA Tier I action levels for radionuclides or VOCs, and T-1 will have been reclaimed

## 3 2 Proposed Action

This action will involve excavating both the drums of depleted uranium chips and approximately 250 cubic yards of soil associated with the depleted uranium in the west end of the trench, and excavating the debris and associated potentially contaminated soils (1 000 to 1,500 cubic yards) in the eastern two-thirds of the trench Potentially pyrophoric uranium chips will be stabilized in a cementation-type process to remove the hazard of pyrophoricity along with contaminated soils associated with the uranium above Tier I action levels for radiological activity Other wastes suspected in the west end of the trench such as cemented cyanide solutions (10 drums) and still bottoms' (1 drum) will also be excavated sampled treated as necessary and staged for appropriate off-site disposal

Soils will be screened segregated and stockpiled at the T-1 site If present VOC-contaminated soils above Tier I action levels will be staged for subsequent treatment using a low temperature thermal desorption remediation technology Upon attainment of thermal desorption unit (TDU) performance goals, treated soil will be backfilled into the excavation following analysis to confirm contaminant concentrations are below Tier I action levels or the TDU performance goals to be determined

Radionuclide contaminated soils will be segregated stockpiled and staged for disposal Soil below the RFCA Tier II action levels will be returned to the trench Soil below Tier I and greater than Tier II levels will be disposed of offsite or returned to the trench within a geotextile fabric The geotextile fabric will allow for future retrieval of the soil if required The remainder of the trench will be filled with clean backfill and the top 6 inches will be covered with topsoil The trench and associated areas used for the accelerated action activities will be reclaimed

3 2 1 Excavation

Conventional excavation techniques will be used to remove the soil drums debris, and contaminated soils at the T-1 site Excavation equipment will consist of a track-mounted excavator backhoe and/or front-end loader The excavator bucket will be equipped with brass or bronze teeth to minimize spark-potential while handling drums containing depleted uranium Drums will be removed from the excavation individually one-at-a-time in order to minimize exposure to workers environment and the public Standard fire prevention and suppression techniques for pyrophoric metals will be utilized Extinguishing agents for the potentially pyrophoric depleted uranium chips will be located immediately adjacent to the excavation site and ready for use Soils drums and debris will be moved in dump trucks roll-offs or by similar transport to a staging/segregation area described in Section 3 2 2

During drum and soil handling activities dust minimization techniques such as water sprays, will be used to minimize suspension of particulates In addition earth-moving operations will not be conducted during periods of sustained high winds The RFETS Environmental Restoration Field Operations Procedure FO 1 Air Monitoring and Particulate Control will be incorporated into the project Air monitoring for radioisotopes VOCs and particulates will be performed during excavation and transport activities

When the excavation is inactive such as downtime or the end of work shifts exposed drums in the trench will be covered with soil and all potentially pyrophoric materials will be contained in a fire-safe configuration At the completion of excavation verification samples will be collected along the base and sides of the excavation to determine the post-action condition of the subsurface soils Samples will be analyzed according to the Sampling and Analysis Plan (SAP) This sampling will be performed after an initial nominal six inch scrape below the drums and debris to clear the trench bottom of any slough material Visible staining which may extend beneath the trench bottom will also be removed prior to collecting samples If analytical results indicate that contamination is present above Tier I action levels, further excavation and sampling will continue until the clean-up target levels listed in Table 3-1 have been met, or the limiting condition (top of unweathered bedrock) is met

If contamination is encountered below the bottom of the trench, the excavation will be limited to the highly weathered bedrock, one to three feet below the alluvial/bedrock contact, or to the depth of groundwater, if encountered. Unweathered bedrock will not be excavated An organic vapor analyzer and a field instrument for the detection of low energy radiation (FIDLER) will be used as field screening tools to guide excavation activities before collection of the excavation verification samples

Cleanup target levels used for the excavation activities are the RFCA Tier I subsurface soil action levels (DOE, 1996) for radionuclides, cyanide and VOCs, if encountered These action levels were incorporated to reduce risk to future site workers and users of the site, and to prevent degradation of groundwater quality above the RFCA Tier I groundwater action levels (DOE, 1996) Table 3-1 lists the radionuclide, VOC, and cyanide cleanup target levels for excavation per RFCA (DOE, 1996) The contaminants listed in Table 3-1 are the potential chemicals of concern for the project. This list was developed by assessing the historical data, retired worker interviews and waste records from the site, and by the use of process knowledge to ascertain what contaminants existed in the drums that were initially buried at the site

**TABLE 3-1**
**CONTAMINANT OF CONCERN**
**CLEANUP TARGET LEVELS FOR EXCAVATION**

| Contaminant | Activity or Concentration |
|---|---|
| Uranium (U-238) | 586 pCi/g |
| Cyanide | 154 000 mg/kg |
| PCE | 11 5 mg/kg |
| TCE | 9 27 mg/kg |

Radiological monitoring of the soils will be performed for protection of the workers the public and the environment in accordance with 10 CFR 835 and the RFETS Radiological Controls Manual (K-H, 1996) If levels of radioactivity are encountered in the soil greater than three times background the soils will be segregated and further sampling and evaluation will be performed to compare radioisotopic concentrations with RFCA subsurface soil action levels

Based on available site characterization data no recoverable free product is expected in the trench Free product if present would likely remain in the soil when excavated and small lenses or pockets when disturbed during excavation will be absorbed by surrounding soils Visibly stained areas of the excavation will be removed If a sufficient amount of recoverable VOC or other hydrocarbon free product is encountered the free product would be containerized characterized, and appropriately disposed offsite

Based on historical groundwater level measurements in the vicinity of T-1, groundwater is not expected to be encountered during excavation activities If groundwater and/or incidental water is encountered during excavation a field sump will be used to transfer the water into a temporary storage container onsite

As part of the Mound Site Source Removal project an extension to the existing Central Avenue ditch located north of T-1 has been installed which will minimize local groundwater recharge to the T-1 area Surface water monitoring will be performed during excavation activities using existing automated stations near the site and storm water run-on and run-off around the excavation will be controlled

3 2 2 Staging/Segregation of Contaminated Materials and Soils

Drums containing waste materials drum fragments debris etc will be evaluated for inclusion into the stabilization process and segregated accordingly Liquids and sludge, if encountered will be segregated and managed appropriately Uranium chips to be stabilized, debris and other waste materials will be transported to the treatment area Wastes not suitable for stabilization will be packaged and disposed of appropriately

Drums containing waste materials drum fragments debris etc will be segregated based on field screening Each drum or artifact will be evaluated and inventoried First materials will be segregated according to suspect radiological contamination, suspect hazardous contamination or suspect mixed contamination (contaminated with both a radiological and hazardous component) Drums will be inspected for labels markings texture color and any other information which may assist in identification Solid materials will then be segregated and assigned to one of the following waste types depleted uranium chips and turnings cemented cyanide wastes suspected classified artifacts debris wastes potentially containing hazardous constituents or unknown materials

Drums identified as containing uranium chips and/or uranium chips in a soil matrix will be containerized and transported to the treatment area for stabilization These materials and wastes should be easily identifiable by visual inspection, radiation screening, and by their location within the trench

Cemented cyanide wastes will be re-packaged and sampled in accordance with the SAP Sampling results will be used to verify the material waste type, characterize the waste for applicable storage, disposal, and treatment options (if required), and/or resolve whether the present waste form is acceptable for disposal The re-packaged waste material will be stored in a Temporary Unit (TU) established for storage of wastes during this project

Artifacts suspected as being "classified" items will be immediately isolated and packaged appropriately The RFETS Classification Office will be contacted to remove the artifact, and store it in a secure location

Miscellaneous debris is expected to include compatible materials such as waste personal protective equipment (PPE), wood, rubber, plastics, paper, and glass excavated from the trench These items will be visually inspected for stains or discolorations, in addition to radiological and volatile organic screening In general, these items are anticipated to be low level radioactive waste materials unless hazardous characteristics are indicated These materials will be packaged appropriately with like waste forms for disposal

Materials which cannot be immediately identified will be repackaged, and sampled to identify the contents Once the material is identified, it will be disposed of properly

Liquids and sludge, if encountered, will be segregated and managed appropriately The excavated containers will be inspected for labels, markings, or other information which may indicate its contents The liquids/sludge will be screened for radiological and volatile organic contamination and will be re-packaged if required, in order to ensure container integrity After container integrity is assured, the liquids will be stored within secondary containment If the liquids/sludge cannot be identified the material will be sampled to determine its characteristics

During the excavation, exposed soils will be screened for volatile organic compounds and radioactivity using appropriate instrumentation and analysis Soils that appear stained or discolored or appear to possess chemical or radiological contamination will be automatically segregated as suspect-contaminated to ensure waste minimization Soils suspected to be clean will be staged and stockpiled for reuse in backfilling and restoration of excavations Sampling of suspect clean soil will be performed according to the SAP

Soils excavated directly from the areas of the trench containing waste drums debris, etc may possess hazardous or radiological characteristics It is anticipated that T-1 received containers as well as many loose items Visual indicators may include miscellaneous debris and particulates mixed in with soils staining and discoloration, odors or other indications from field instruments that indicate the soils may be contaminated

Soils suspected to be either radiologically or VOC contaminated will be temporarily staged in either roll-off containers or contaminated soil stockpiles (CSS), in the northeast trenches area This site was chosen because it is relatively flat and contains support trailers and utilities from the previous environmental restoration projects at RFETS The CSSs will be designed to contain the contaminated soil and minimize wind blown dispersion and storm water interaction with the soil by using concrete barriers and a water-resistant tarpaulin In addition, a plastic lined ditch will be constructed surrounding the stockpile to capture local stormwater Storm water collected from this ditch may be used to control dust on soils awaiting treatment or will be collected for onsite treatment at the Consolidated Water Treatment Facility (CWTF) in Building 891 Air monitoring for VOCs particulates and radioisotopes will be performed during staging of soils in the CSSs Dust minimization will be performed during the staging of soils in the CSSs and a water-resistant tarpaulin or equivalent will be placed after daily stockpiling operations

Storm water collected from the trench may be used to control dust on soils awaiting treatment or will be collected for onsite treatment at the CWTF in Building 891 Dust minimization will be performed during the excavation and soil handling

3 2 3 Treatment

A stabilization process will be utilized to encapsulate uranium metal chips and incidental radioactively contaminated soils and other low-level radioactive debris associated with the depleted uranium recovered from the trench Radiologically contaminated soil and debris above RFCA Tier I action levels not intimately associated with the depleted uranium waste will be excavated treated if necessary and staged for disposal Stabilization involves mixing the wastes with a stabilization agent to form a solid monolith Encapsulation within the monolith isolates the uranium from oxygen and moisture rendering it stable and non-reactive Stabilization techniques can be sensitive to the presence of oils or solvents If these materials are detected the stabilization mixture may be modified or the oils/solvents may be separated and containerized Following stabilization the monolith will be sampled to support off-site disposal waste acceptance criteria and will include analysis by the EPA Toxicity Characteristic Leaching Procedure (TCLP) metals VOCs and reactivity These activities will be conducted within a temporary containment structure

The temporary structure (e g Sprung Instant Structure) would provide a sealed environment for performing treatment operations The structure would be constructed near T-1 with secondary containment for spill control and would be equipped with a high efficiency particulate air (HEPA) filter system to control potential airborne contaminants The structure would be constructed of flame retardant materials and would be designed to shed snow and withstand high winds and hail in accordance with RFETS building codes and standards

As a contingency, if sufficient VOC-contaminated soils and debris are present to justify the expense, a low-temperature TDU will be used to remove the VOCs from contaminated soils in a non-destructive manner If thermal desorption is used, the TDU will be similar to that described in the Mound PAM (DOE, 1996), and the performance goals for the VOCs would be as discussed for the Mound project Soil would be staged pending mobilization of a TDU

3 2 4 Site Reclamation

At the completion of remediation activities, radiological surveys of the T-1 Site excavation and treatment areas will be performed and the areas will be revegetated. Radiological surveys of the equipment will be performed per the RFETS Radiological Control Manual (K-H, 1996) prior to release from RFETS Excavation, stabilization, and all other treatment support equipment will be decontaminated Revegetation will be performed in accordance with guidance from RFETS ecologists using approved seed mixtures

3 3 Worker Health and Safety

Due to the contaminants present in T-1 this project falls under the scope of the Occupational Safety and Health Administration (OSHA) construction standard for Hazardous Waste Operations and Emergency Response 29 Code of Federal Regulations (CFR) 1910 120 Under this standard a Site-Specific Health and Safety Plan (HASP) will be developed to address the safety and health hazards of each phase of site operations and specify the requirements and procedures for employee protection In addition the DOE Order for Construction Project Safety and Health Management 5480 9A applies to this project This order requires the preparation of Activity Hazard Analyses (AHAs) to identify each task, the hazards associated with each task and the precautions necessary to mitigate the hazards The AHAs will be included in the HASP

An Activity Control Envelope (ACE) review is being performed to develop the safety envelope for performing the T-1 remediation The ACE team consists of a group of individuals with varied training and backgrounds relevant to the T-1 project and includes subject matter experts on treating potentially pyrophoric depleted uranium nuclear safety health and safety radiation control excavation processes waste handling and treatment, as well as the DOE project representative The ACE team will perform an AHA for each of the activities These AHAs will be incorporated into the HASP A nuclear safety analysis document is also being developed for the T-1 project in parallel with the ACE review Any specific requirements of the nuclear safety analysis that are not covered by the ACE AHAs will also be incorporated into the HASP The ACE process is evaluating special safety and radiological concerns of handling depleted uranium drums in an unknown condition and configuration, including fire hazard radiological and chemical exposure

This project could expose workers to physical, chemical, and low levels of radiological hazards Physical hazards include those associated with excavation activities, use of heavy equipment noise heat stress, cold stress, and work on uneven surfaces In addition, there is potential for a uranium chip fire Fire safety will be addressed in the HASP and in a job-specific fire prevention and response plan

Physical hazards will be mitigated by engineering controls, administrative controls, and appropriate use of PPE Chemical hazards will be mitigated by the use of PPE and administrative controls Appropriate skin and respiratory personal protective equipment will be worn throughout the project Routine VOC monitoring will be conducted with an organic vapor monitor for any employees who must work near the drums of waste or related contaminated soil Based on employee exposure evaluations the Site Health and Safety Officer may downgrade personal protective equipment requirements, if appropriate

The HASP details project 'radiological hold points," to address contaminated debris contaminated drums or removable contamination above limits Radiation monitoring will be included in the HASP per the RFETS Radiological Control Manual (K-H, 1996)

If field conditions vary from the planned approach, an AHA will be prepared for the existing circumstances and work will proceed according to the appropriate control measures Data and safety controls will be continually evaluated Field radiological screening will be conducted using radiological instruments appropriate to detect surface contamination and airborne radioactivity As required by 10 CFR 835 Radiation Protection of Occupational Workers all applicable implementing procedures will be followed to insure protection of the workers Co-located workers the public, and the environment The HASP describes the air monitoring equipment to be used to monitor for radiation VOCs, and particulates Dust minimization techniques will be used to control suspension of contaminated soils and particulates

## 3 4 Waste Management

Stabilized depleted uranium chips and associated soils and metal debris e g drum carcasses will be packaged to meet the waste acceptance criteria (WAC) of the receiving facility and will be stored onsite pending final off-site disposition at either a low-level or low-level mixed waste repository Waste associated with the stabilization process will be screened for radiological contamination If this waste is not low-level or low-level mixed it will be placed in the on-site landfill

Water collected from the excavation (if any) will be managed as incidental waters per site procedure 1-C91-EPR SW 01 If the water requires treatment, it will be treated in the CWTF located in Building 891 Following treatment, the water will be sampled and released in accordance with CWTF discharge criteria.

Metal and other debris including empty drums will be decontaminated if possible and placed in the on-site landfill If the debris cannot be radiologically decontaminated, it will be sized and packaged for off-site disposal as low-level waste Sizing will be performed with equipment designed and people trained to perform that function, e g portable hydraulic drum crushers HEPA filters (if any) from the temporary stabilization facility may contain low levels of radionuclides and will be managed on-site until they can be sent off-site to an approved disposal facility Any secondary wastes generated as part of this proposed action, such as personal protective equipment, will be characterized based on process knowledge and radiological screening Wastes identified as non-radiological and non-hazardous will be disposed at the landfill Wastes identified as hazardous or low level/low level-mixed will be stored on-site pending shipment off-site to an appropriate disposal facility Wastes will be managed, recycled, treated, and /or disposed in accordance with RFETS policies and procedures, and in accordance with Federal, State and local laws and regulations The Closure Report for the project will document the types volumes, and disposition of all wastes generated by this project



## 4 0 ENVIRONMENTAL IMPACTS

The National Environmental Policy Act (NEPA) requires that actions conducted at the RFETS consider potential impacts to the environment and NEPA values The no action alternative was not considered No action is unacceptable because it would result in no improvement to the contaminated soil resources or the risk to the environment of leaving the waste in place Air quality impacts are expected to be of short duration and of deminimus quantity, and will be mitigated by dust suppression techniques and excavation controls Dusts generated during the stabilization process will be controlled by engineering barriers including use of a temporary structure to cover the stabilization process area. Surface water and groundwater quality and wetlands impacts are not anticipated Only limited, temporary changes to groundwater flow are anticipated due to the small area excavated and the depth of excavation which will be above the average groundwater table Clearance for concerns related to the Migratory Bird Treaty Act and threatened and endangered species will be obtained from RFETS ecologists prior to any construction/excavation activity

The excavation and stabilization areas have been disturbed over the past forty years This action is not anticipated to have direct or indirect or irreversible and irretrievable impacts to natural resources at RFETS and ultimately the action will improve natural resources by removing a known radiological contamination source Revegetation will mitigate any impacts caused by this action and the previous disturbances Impacts to the soil s ability to support vegetation following excavation and backfill will be addressed Given the relatively small area of excavation and backfill and the project's short duration, impacts to fauna will also be limited and of short duration Because the project is located away from any surface water, wetlands or habitat suitable for the threatened and endangered species known to inhabit RFETS, impacts to threatened and endangered species and migratory birds are not anticipated Periodic surveys for these species will be conducted per RFETS procedures Historic and cultural resources are not present at the site

Human health impacts are addressed through requirements for worker protection and requirements to control the dispersion of contamination to air, water and soil The native vegetation has already been disturbed A net improvement in resource quality will occur and will be consistent with both the short and long term uses anticipated at RFETS Cumulative impacts will be extremely limited or nonexistent due to the project's short duration Areas disturbed during the project will be revegetated per guidance from RFETS ecologists Historic impacts to soil and potential impacts to groundwater will be reduced

## 5 0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

RFETS accelerated actions performed under a PAM must attain to the maximum extent practicable Federal and State applicable or relevant and appropriate requirements (ARARs) For that reason the substantive attributes of the Federal and State ARARs must be identified

In addition RFCA provides for waiver of permits for accelerated actions conducted in the buffer zone (RFCA ¶16 a ) T-1, the containment building and any temporary units (TUs) will all be located in the buffer zone For each permit waived RFCA requires identification of the substantive requirements that would have been imposed in the permit process (RFCA ¶17) Further the method used to attain the substantive permit requirements must be explained (RFCA ¶17c) The following discussion is intended to compliment other descriptions provided in the PAM in a manner that satisfies the RFCA permit waiver requirements

### 5 1 Chemical-Specific Requirements and Considerations

The only chemical-specific ARAR identified was the National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclides In addition the RFCA Action Levels and Standards Framework (ALF) Tier I subsurface soil action levels were identified as to-be-considered

#### 5 1 1 NESHAPs

The 40 CFR §61 92 is applicable and requires that no member of the public receive more than 10 mrem per year above background from airborne sources of radiation Demonstration of compliance with 40 CFR §61 92 is performed on a sitewide basis taking into consideration all RFETS sources Monitoring is required for all release points which could contribute greater than 0 1 mrem/year

### 5 1 2 Action Level Framework

The Tier I subsurface soil action levels provided in the RFCA ALF were considered and adopted as the cleanup target levels for uranium and cyanide Similarly if sources of VOCs are encountered, the ALF Tier I subsurface soil actions levels will be adopted as the cleanup target levels (See Table 3-1)

## 5 2 Action-Specific Requirements and Considerations

The following action-specific requirements and considerations were evaluated specific to the T-1 project

- Definition of Remediation Waste
- Identification and Listing of Hazardous Wastes
- Land Disposal Restrictions
- Containment Building
- Contaminated Soil Stockpiles
- Temporary Unit Tank and Container Storage
- Particulate Emission Controls
- Debris Treatment

### 5 2 1 Remediation Waste

In RFCA remediation waste is defined as all

*(1)* *Solid, hazardous and mixed wastes*
*(2)* *All media and debris that contain hazardous substances listed hazardous or mixed wastes or that exhibit a hazardous characteristic and*
*(3)* *All hazardous substances* (See RFCA ¶25 bf )

A parallel definition is also found in 40 CFR §260 10 As such, the definition of remediation waste is applicable to all wastes environmental media (soil groundwater surface water, stormwater and air) and debris generated in conjunction with this action

5 2 2 Identification and Listing of Hazardous Waste

The depleted uranium is exempt from RCRA as a byproduct material (See 42 U S C §6903 (27)) Regardless, the pyrophoric depleted uranium is sufficiently similar to wastes that exhibit ignitible or reactive characteristics to warrant management in a manner that attains relevant and appropriate ARARs, to the maximum extent practicable, for as long as the uranium remains pyrophoric The relevant and appropriate management ARARs are identified below in sections 5 2 4 5 2 5, and 5 2 6

The historical record indicates that 10 drums of cemented cyanide wastes were disposed in T-1 The cyanide wastes could have originated from either listed electroplating sources or non-listed heat treating activites conducted in Building 444 Because of the uncertainty as to the source, any cyanide waste, soil/waste mixture, debris or wastewater will be considered potentially reactive until tested and determined otherwise (See 40 CFR §261 23(a)(5)) Where appropriate any cyanide waste soil/waste mixtures debris or wastewater will be evaluated for other hazardous characteristics

The operational record reveals only one instance where a single drum of still bottoms was disposed in T-1 This occurred during a period where material identified as perclene still bottoms were routinely taken to the Mound Site The drum originated in Building 444 where distillation of lathe coolants also occurred The uncertainty as to the source the non-routine nature of the activity, and the doubt about T-1 as a source of VOC groundwater contamination do not at this time justify identification of any RCRA listed waste codes as ARAR for VOCs If T-1 is identified as a source of VOC groundwater contamination appropriate ARARs (e g F0 1 from still bottoms from PCE used for degreasing) will be identified to address soil excavation and disposition

5 2 3 Land Disposal Restrictions

Any reactive cyanide waste, soil/waste mixture debris or liquid requires treatment to the Land Disposal Restrictions (LDR) levels for wastewater or non-wastewaters as appropriate (See §268 40 Treatment Standards for Hazardous Wastes D003 Reactive Cyanides Subcategory) D003 reactives are not subject to evaluation of underlying hazardous constituents (See §268 40(e))

Remediation wastewaters generated during remediation will be transferred to the CWTF (Building 891) for treatment If these remediation wastewaters contain listed RCRA hazardous wastes or if the remediation wastewaters exhibit a RCRA characteristic the RCRA hazardous waste codes would not be applicable or relevant and appropriate because of the Waste Water Treatment Unit Exclusion (see §260 10 and §264 1(g)(6)) Prior to treatment the remediation wastewaters will be analyzed to ensure consistency with the Colorado Department of Public Health and Environment (CDPHE) 'Policy on Wastewater Treatment Unit Exemption" dated June 25, 1991 The CWTF will treat the remediation wastewaters to meet applicable surface water quality standards under a National Pollution Discharge Elimination System ARARs framework.

Any waste generated as the result of treatment of a listed waste will be assigned the corresponding waste code Wastes generated as a result of the treatment of waste water will also be evaluated to determine if they exhibit a hazardous characteristic

5 2 4 Containment Structure

Waste soil/waste and debris treatment will be conducted in a temporary containment structure The requirements include design criteria operating standards, and closure standards (See 40 CFR 264 1100)

The design criteria for the containment structure require that the structure be an enclosed, self-supporting structure with a durable primary barrier that is compatible with the wastes being managed The building must assure containment by preventing exposure to the elements, (e g precipitation wind run-on) and be of sufficient structural strength to accommodate local geotechnical considerations climatic conditions and operational stresses

For limited management of liquids in the containment structure, secondary containment appropriate to the types and quantities of liquids to be managed will be identified during design of the containment building and implemented as part of construction

Operationally the primary barrier must be maintained free of significant cracks, gaps, corrosion or other deterioration The level of waste within the containment must allow some freeboard above the waste The structure must be operated to prevent tracking of wastes from the unit by personnel and equipment Fugitive dust emissions must be controlled to a no visible emissions level

For closure all wastes and contaminated subsoils must be removed, and structures and equipment must be decontaminated or managed as waste

Table 5-1 identifies the general RCRA requirements that are being identified as relevant and appropriate to the Containment Structure the CSSs and the Temporary Units

§264 Subpart C Preparedness and Prevention is addressed in the RFETS RCRA Part B Permit and by RFETS infrastructure Similarly §264 Subpart D Contingency Plan and Emergency Procedures is also addressed in the RFETS RCRA Part B Permit and by RFETS infrastructure

§264 Subpart E requirements are administrative in nature and will not be applicable or relevant and appropriate

**TABLE 5-1**
**GENERAL RCRA SUBSTANTIVE REQUIREMENTS**

| Citation and Title | Requirement |
|---|---|
| §264 13 - Waste Analysis | Satisfied by characterization data presented in the PAM |
| §264 14 - Security | Rely on RFETS infrastructure |
| §264 15 - General Inspection Requirements | Personnel will inspect equipment during operations as provided in the Field Implementation Plan |
| §264 16 - Personnel Training | Training requirements will be identified in the project Health and Safety Plan |

5 2 5 <u>Contaminated Soil Stockpile(s)</u>

The contaminated soil stockpile(s) (CSSs) will be located within the large area of contamination east of the plant site where waste management activites were historically conducted Details on the configuration and operation of the CSSs are provided in section 3 2 2 The movement and stockpiling of wastes within the East Trenches area of contamination (AOC) will not trigger LDRs (see 55 FR 8760) The CSSs will also be subject to the general RCRA requirements identified in Table 5-1

For closure wastes and contaminated subsoils must be removed and structures and equipment must be decontaminated or managed as waste

5 2 6 <u>Temporary Unit Tank and Container Storage</u>

The establishment of TUs may require a permit waiver if any of the tanks or containers are used for longer than 90-days Therefore the discussion in this section is provided to satisfy ¶17 of RFCA

§264 553 provides that temporary tanks and containers used for the storage or treatment of hazardous remediation wastes may be subject to alternative design and operating and closure requirements as long as the requirements are protective of human health and the environment (See

§264 553(a)) The TU must be located within the facility boundary and may only be used for treatment or storage of remediation wastes (See §264 553(b))

In establishing requirements for TUs seven factors must be considered. the length of time the unit operates the type of unit, the volumes of remediation waste, the physical and chemical characteristics of the remediation waste, the potential for releases, the conditions at the site that will influence migration and the potential for exposure if a release occurs (See §264.553(c))

In conjunction with the T-1 remediation, all tanks and containers will be compatible with the waste and be in good condition Where practicable, secondary containment will be provided when liquid wastes are stored or treated in tanks or containers In addition, the TUs will also be subject to the general RCRA requirements identified in Table 5-1

For closure, wastes and contaminated subsoils must be removed, and structures and equipment must be decontaminated or managed as waste

5 2 7 Particulate Emission Controls

Colorado Code of Regulations (CCR) 5 1000-3, Regulation No 1 , Section III.(D)(2)(b), (e), and (f) requires control measure to be implemented for construction activity, haul roads and haul trucks to prevent emission of fugitive particulates in excess of air standards During soil handling activities dust minimization techniques such as water sprays, will be used to minimize suspension of particulates In addition earth-moving operation will not be conducted during periods of high wind The RFETS Environmental Restoration Field Operation Procedure FO 1, Air Monitoring and Particulate Control will be incorporated into the project.

5 2 8 Debris Treatment

Where appropriate, tanks the project decontamination pad or the Main Decontamination Facility may be configured to perform low level, hazardous or mixed waste debris treatment in accordance with 40 CFR §262 34 §268 7(a)(4) and §268 45 The debris will be treated in accordance with the §268 45 treatment standards Specifically, §268 45 Table 1, A 1 e. provides for treatment using high pressure steam and water spays and §268 45 Table 1, A 2 a. provides for water washing and spraying Following treatment, as long as the debris does not exhibit a hazardous waste characteristic the debris will no longer contain a listed hazardous waste and will no longer be subject to RCRA hazardous waste ARARs onsite or to RCRA hazardous waste requirements if disposed offsite

Solid residues from the treatment of debris containing listed hazardous wastes will be collected and managed in accordance with RCRA hazardous waste management ARARs Any solid residues from debris treatment that exhibit a hazardous waste characteristic will also be managed in accordance with RCRA hazardous waste management ARARs

Liquid residues from the treatment of debris containing listed hazardous wastes that comply with the CDPHE Wastewater Treatment Unit Policy are subject to RCRA hazardous waste management ARARs until they are placed into the B891 Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Wastewater Treatment Unit headworks Any B891 residues that result from the treatment of listed debris treatment liquid residues will carry the same listing as the listed debris from which it originated Any B891 residues that exhibit a hazardous waste characteristic will also be managed in accordance with RCRA hazardous waste management ARARs

### 5 3 Location-Specific Requirements and Considerations

No location-specific requirements or considerations unique to the activity were identified Applicable RFETS site procedures and DOE orders will be followed

## 6 0 IMPLEMENTATION SCHEDULE

The remediation of T-1 is scheduled to commence the first quarter of fiscal year 1998 Treatment of contaminated soils if encountered is scheduled to begin immediately after the excavation activities during spring 1998 Data reduction and reporting efforts are scheduled to be completed by September 1998 Any delays scope or budget changes may affect these dates

# 7 0 REFERENCES

Chem Risk, 1992 *Project Tasks 3 & 4 Final Draft Report, Reconstruction of Historical Rocky Flats Operations & Identification of Release Points* Prepared for Colorado Department of Health, August 1992

Cichorz R S 1970, *Analysis Report for Sample from Still Bottom, Building 44 3-7-55*, July

Cohen R M and Mercer, J W , 1993, *DNAPL Site Evaluation*, C K Smoley, Boca Raton, FL

DOE, 1992 *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO

DOE 1994 DOE - *Handbook - 1081-94 Primer on Spontaneous Heating and Pyrophoricity*

DOE 1995, *Phase II RFI/RI Report for Operable Unit No 2 - 903 Pad, Mound and East Trenches Area* Rocky Flats Environmental Technology Site, Golden, CO

DOE 1997, *Draft Background Comparison for Radionuclides in Groundwater* January

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden CO

EG&G Rocky Flats Inc 1991 *Air Pollutant Emission Notice (APEN) Report*, Buildings 444 445 450 and 455

EG&G Rocky Flats, Inc , 1993, *Revision of Air Pollutant Emission Notice (APEN) Report*, Buildings 444 445 450, and 455, December 3 1993

EG&G Rocky Flats Inc , 1994, *Soil Vapor Survey Report for the Operable Unit 2 Subsurface Interim Remedial Action* January

EG&G Rocky Flats, Inc , 1994, *Waste Stream and Residue and Characterization* Building 444 Version 5 0 April 5 1994

EG&G Rocky Flats, Inc , 1995, *Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site Volume II of the Sitewide Geoscience Characterization Study* April

EPA, 1992, *Estimating Potential for Occurrence of DNAPL at Superfund Sites* OSWER Publication 9355 4-07/FS

Illsley C T *Environmental Analysis*, January 28 1983

Kaiser-Hill (K-H) Inc 1996, *Rocky Flats Environmental Technology Site Radiological Controls Manual*

Rains W A and R W Hawley, 1955, *Problem 0008 Building 444 Machine Coolant Treatment and Disposal - Final Report*, January

Rocky Mountain Remediation Services (RMRS), 1996a *Draft Trenches and Mound Site Characterization Report* RF/ER-96-0044 UN September

RMRS, 1996b *Results of the 1996 Pre Remedial Investigation of the Mound Site* RF/RMRS-96-0055 UN September

RMRS 1996c *Sampling and Analysis Plan to Support the Source Removal at the Mound Site IHSS 113* RF/RMRS-96-0060